

Application Serial No: 09/615,101  
Attorney Docket No.: 51914 (ACT-120)

### REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject matter identified in caption, as amended, in light of the remarks that follow are respectfully requested.

As correctly noted on the Office Action Summary, claims 1-41 are pending in the application and are under consideration.

By the foregoing amendments, claims 1 and 20 have been revised to further describe the 2-dimensional optical fiber array structure. Claim 20 has further been amended in response to the §112, second paragraph rejection, discussed below. Claim 40 has been amended to point out that each etched stick has a plurality of notches. Claims 42-45 have been newly added to point out further aspects of the invention. Support for the new claims can be found, for example, in original claim 31. Other amendments are generally to correct spelling or otherwise for form. Entry of the amendments is proper at least because the Official Action was prematurely placed under final rejection, for the reasons set forth below. This notwithstanding, the claims are not believed to raise new issues.

#### Request to Withdraw Finality

Applicants respectfully request that the "final" status of the outstanding Official Action be withdrawn, as being premature. In this regard, MPEP 706.07(a) states that:

[S]econd or any subsequent actions on the merits shall be final, except where the examiner introduces a new ground of rejection that is neither necessitated by applicant's amendment of the claims nor based on information submitted in an information disclosure statement . . . .

A new ground of rejection was presented in the final Official Action that was not necessitated by applicants' previous claim amendments. More specifically, the outstanding Official Action rejects claims 1-41 under 35 U.S.C. §103(a) over *Leaman et al* (U.S. Patent No. 5,430,825) in view of *Byrum* (U.S. Patent No. 4,681,656), *Jiang* (U.S. Patent No. 5,913,002), *Mansour* (U.S. Patent No. 6,263,220), *Chande et al* (U.S. Patent No. 4,744,627), *Boudreau et al* (U.S. Patent No. 5,905,831), *Benzoni et al* (U.S. Patent No.

Application Serial No: 09/615,101  
Attorney Docket No.: 51914 (ACT-120)

5,259,054), *Basavanhally* (U.S Patent No. 5,483,611), *Miller* (U.S Patent No. 3,864,018) and *Kato* (U.S Patent No. 5,853,626). (See final Official Action at page 2). The rejection set forth in the previous Official Action issued March 4, 2002, additionally relies on *Anthony et al* (U.S. Patent No. 4,659,760). Accordingly, withdrawal of "finality" of the Official Action is respectfully requested.

Turning now to the Official Action, use of the singular form for "notch" in claim 1 has been questioned. While claim 1 has been amended by replacing "notch" with "notches", applicants note that use of the singular form for "notch" is not inconsistent with the invention. In this regard, the cages can be formed using a single notch, for example, as illustrated in Figure 6b, or using a plurality of notches, for example, as illustrated in Figure 6a. Claims 20-36 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite. This rejection has been obviated by the amendment to claim 20, by which it has been pointed out that the sticks are "formed by etching a wafer". Accordingly, withdrawal of this rejection is respectfully requested.

Claims 1-41 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Leaman et al* (U.S Patent No. 5,430,825) in view of *Byrum* (U.S Patent No. 4,681,656), *Jiang* (U.S Patent No. 5,913,002), *Mansour* (U.S Patent No. 6,263,220), *Chande et al* (U.S Patent No. 4,744,627), *Boudreau et al* (U.S Patent No. 5,905,831), *Benzoni et al* (U.S Patent No. 5,259,054), *Basavanhally* (U.S Patent No. 5,483,611), *Miller* (U.S Patent No. 3,864,018) and *Kato* (U.S Patent No. 5,853,626). This rejection is respectfully traversed for the following reasons.

This rejection, as well as the other §103 rejections set forth in the final Official Action, are improper at least because they does not meet the *Graham v. John Deere* (383 U.S. 1 (1966)) and PTO requirements for establishing a *prima facie* case of obviousness. In this regard, a §103(a) rejection should include:

- (A) the relevant teachings of the prior art relied upon . . . ,
- (B) the difference or differences in the claim over the applied reference(s), (C) the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter, and (D) an explanation why one of ordinary skill in the art . . . would have been motivated to make the proposed modification. (See MPEP706.02j).

Application Serial No: 09/615,101  
Attorney Docket No.: 51914 (ACT-120)

The final Official Action (read with the first Official Action) in no way meets these requirements for each of the claim features for each of the claims rejected. Various claim features are ignored altogether, or one or more of the foregoing requirements, particularly the motivational requirement (D), are not addressed. This rejection should be withdrawn at least for these reasons. This rejection should be withdrawn for the following additional reasons.

The present invention relates to apparatus for aligning optical fibers in a 2-dimensional array, and for methods for making a 2-dimensional optical fiber array. As discussed in the "Background" section of the present application, 1-dimensional fiber arrays are commonly manufactured using wet anisotropic etching of <100> silicon to form V-grooves. This etching technique allows for accurate positioning of optical fibers in 1-dimensional arrays. It is, however, very difficult to manufacture 2-dimensional arrays having high accuracy. In this regard, the stacking of chips formed by this conventional etching technique relies on the wafer thickness having an accurately defined thickness. Through the present invention, applicants have provided apparatus and methods relating to 2-dimensional arrays which provide extremely accurate alignment of optical fibers in a 2-dimensional array, the accuracy being independent of wafer thickness.

*Leaman et al* discloses a construction technique for manufacturing fiber optic light assemblies for use as displays and for illumination purposes (col. 1, lines 6-8). A plurality of fiber optic strands 10 are drawn between a pair of spaced apart inserts 12 and 14. The inside surfaces of the inserts 12 and 14 each have a plurality of slots 16 for accommodating an individual fiber. (Col. 2, lines 15-21).

*Leaman et al* does not disclose or suggest each feature of the present invention. For example, *Leaman et al* does not disclose or fairly suggest an apparatus for aligning optical fibers in a 2-dimensional array, wherein optical fibers are oriented perpendicular to the front surfaces in a 2-dimensional array, as set forth, for example, in independent claims 1 and 20. Nor does *Leaman et al* disclose or fairly suggest notches having surfaces that are directional dry etched sidewall surfaces formed by directional dry etching perpendicular to the front surface, as set forth in claims 1 and 20.

Application Serial No: 09/615,101  
Attorney Docket No.: 51914 (ACT-120)

Nor does *Leaman et al* disclose the presently claimed methods. For example, claim 37 sets forth a method for making a 2-dimensional optical fiber array, comprising the steps of: a) forming a perforated chip having a plurality of holes located according to a 2-dimensional pattern, wherein the holes are located along lines; b) cleaving the chip along the lines of holes so that the perforated chip is separated into etched sticks, whereby the holes form notches in the etched sticks; c) stacking the etched sticks with optical fibers disposed in the notches so that the optical fibers are arranged according to the 2-dimensional pattern. *Leaman et al* does not disclose or fairly suggest even one of steps a-c.

Claim 40 sets forth a method for making a 2-dimensional optical fiber array, comprising the steps of: a) directionally dry etching a plurality of etched sticks from a flat substrate, wherein each etched stick has a plurality of notches, and wherein each etched stick has top and bottom surfaces defined by a mask during directional dry etching; b) stacking the etched sticks with optical fibers disposed in the notches so that the optical fibers are arranged in a 2-dimensional pattern and so that the optical fibers are caged by the notches, and so that the optical fibers are oriented essentially parallel with the directional dry etching direction. Again, *Leaman et al* does not disclose or suggest step a or b.

The secondary references *Byrum, Jiang, Mansour, Chande et al, Boudreau et al, Benzoni et al, Basavanhally, Miller and Kato* do not cure the foregoing deficiencies in the primary reference. It is well established that there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the primary reference or combine reference teachings. Such suggestion or motivation is lacking here.

As described above, applicants have provided apparatus and methods relating to 2-dimensional arrays which provide extremely accurate alignment of optical fibers in a 2-dimensional array, the accuracy being independent of wafer thickness. The problems faced by applicants relating to 2-dimensional arrays and their solutions are not suggested by *Leaman et al* and are not relevant to the *Leaman et al* light assemblies. Furthermore, the secondary references have nothing whatsoever to do with light assemblies such as disclosed by *Leaman et al*. There is simply no motivation, absent applicants'

Application Serial No: 09/615,101  
Attorney Docket No.: 51914 (ACT-120)

specification, to combine the references in the manner suggested in the Official Action. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 20-36 stand rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over *Kato* alone or taken in view of *Chande et al.* This rejection is respectfully traversed for the following reasons.

It is well established, that in order to establish anticipation under §102(b), each element of the claim in issue must be found, either expressly described or under principles of inherency, in a single prior art reference. *Kalman v. Kimberly-Clark Corp.*, 218 USPQ 789 (Fed. Cir. 1983). This is not the case for *Kato*.

*Kato* does not disclose or suggest each feature of the present invention. For example, *Kato* does not disclose or suggest an apparatus for aligning optical fibers in a 2-dimensional array, wherein optical fibers are oriented perpendicular to the front surfaces in a 2-dimensional array, as set forth, for example, in independent claim 20. *Kato* discloses a 1-dimensional fiber array. Quite clearly, a 1-dimensional fiber array is in no way suggestive of a 2-dimensional fiber array.

Nor does *Kato* disclose or suggest sticks formed by etching a wafer having a wafer thickness direction such that the wafer thickness direction is parallel to the optical fiber disposed in the cage. This feature allows for the formation of the notches along the wafer thickness direction, thus making possible accurate alignment of the optical fibers in the 2-dimensional array, independent of wafer thickness. Quite to the contrary, the *Kato* V-grooves are formed parallel to the substrate thickness direction.

*Chande et al* does not cure the above-described deficiencies in *Kato*. *Chande et al* is relied on for that document's disclosure of loosening screws 27 and holes 29 (March 4, 2002 Official Action at page 3). The entirety of the rejection as it relates to *Chande et al* reads as follows: "Obvious to use 27,29 of *Chande*" (Id.). There is no motivation to combine *Chande et al* with *Kato*. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 1-41 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Miller* in view of *Byrum*, *Kato*, *Boudreau et al* and *Chande et al*. This rejection is respectfully traversed for the following reasons. Accordingly, withdrawal of this rejection is in order.

Application Serial No: 09/615,101  
Attorney Docket No.: 51914 (ACT-120)

This rejection is improper at least for the reasons set forth above, in that the rejection does meet the *Graham v. John Deere* (383 U.S. 1 (1966)) and PTO requirements for establishing a *prima facie* case of obviousness. In this regard, the Examiner has combined various teachings from different references without even attempting to set forth motivational statements for the combinations.

*Miller* discloses a 2-dimensional optical fiber array. However, *Miller's* array and method of formation are not suggestive of the present invention. For example, *Miller* does not disclose or fairly suggest notches having surfaces that are directional dry etched sidewall surfaces formed by directional dry etching perpendicular to the front surface, as set forth in claims 1 and 20. Structurally, such dry etching allows for extremely accurate alignment of optical fibers in a 2-dimensional array, the accuracy being independent of wafer thickness.

Nor does *Miller* disclose or suggest the presently claimed methods. For example, *Miller* does not disclose or suggest a) forming a perforated chip having a plurality of holes located according to a 2-dimensional pattern, wherein the holes are located along lines, or b) cleaving the chip along the lines of holes so that the perforated chip is separated into etched sticks, whereby the holes form notches in the etched sticks, as set forth in independent claim 37.

Further, *Miller* does not disclose or suggest a) directionally dry etching a plurality of etched sticks from a flat substrate, wherein each etched stick has a plurality of notches, and wherein each etched stick has top and bottom surfaces defined by a mask during directional dry etching, or stacking the etched sticks with optical fibers so that the optical fibers are oriented essentially parallel with the directional dry etching direction.

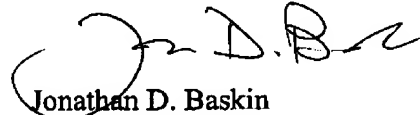
There is simply no suggestion that *Miller* can or should be modified by the secondary references, *Byrum*, *Kato*, *Boudreau et al* or *Chande et al*. Accordingly, withdrawal of this rejection is respectfully requested.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

Application Serial No: 09/615,101  
Attorney Docket No.: 51914 (ACT-120)

If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at his earliest convenience.

Respectfully submitted,



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